



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/17)**

Montreal, 24 to 28 April 2017

Agenda Item 5: Specific work items identified by the Air Navigation Commission:

**5.3: Mitigating risks posed by the carriage of lithium batteries by air (ANC job card
DGP.003.01)**

**RESTRICTING THE PACKING, OVERPACKING AND LOADING OF LITHIUM BATTERIES
WITH FLAMMABLE DANGEROUS GOODS**

(Presented by D. Brennan)

SUMMARY

This working paper proposes that revisions be made to Packing Instructions 965 and 968 to restrict flammable dangerous goods from being in the same outer packaging with lithium batteries, UN 3090 and UN 3480; that packages containing lithium batteries, UN 3090 and UN 3480 not be in the same overpack with flammable dangerous goods; and that packages and overpacks of lithium batteries, UN 3090 and UN 3480, be segregated from flammable dangerous goods when loaded in a unit load device (ULD) or loaded into a cargo compartment.

Action by the DGP-WG: The DGP-WG is invited to revise Parts 4 and 7 as shown in the appendices to this working paper.

1. INTRODUCTION

1.1 At the 2016 meeting of the Dangerous Goods Working Group (DGP-WG/16, Montreal, 17 to 21 October 2016) (DGP-WG/16) the panel member nominated by the United States submitted a working paper that sought consideration of segregation of lithium batteries from dangerous goods in Class 3 when loaded into an aircraft (DGP-WG/16-WP/20 refers).

1.2 In the discussions on the working paper at DGP-WG/16, there were a number of issues raised, one being that there should be consideration of limiting the packing of lithium batteries in the same outer packaging with certain other dangerous goods and also restricting placing packages containing lithium batteries in an overpack with packages containing these dangerous goods.

1.3 It was also suggested that dangerous goods other than just those in Class 3 should be taken into account to more broadly consider the potential risk of flammable dangerous goods in close proximity with lithium batteries.

1.4 This working paper takes the issues raised during the discussion at DGP-WG/16 on segregation of lithium batteries and proposes revisions to Packing Instruction 965 and Packing Instruction 968 to prohibit dangerous goods in Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 and Division 5.1 from being packed in the same outer packaging with lithium batteries. It is also proposed to prohibit packages prepared in accordance with Packing Instruction 965 or Packing Instruction 968 from being placed into an overpack with packages containing dangerous goods in Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 and Division 5.1.

1.5 The proposed changes to the packing instructions address the potential hazard of flammable dangerous goods being packed in close proximity with lithium batteries and therefore further contributing to the severity of a fire, should one occur.

1.6 Restricting the shipper from packing or overpacking lithium batteries with flammable dangerous goods also applies a mitigation action at the start of the supply chain which will support the operator's risk mitigation actions at acceptance.

1.7 In addition, it is proposed to introduce segregation requirements for packages of lithium batteries, UN 3090 and UN 3480, prepared in accordance with Sections IA and IB of Packing Instructions 965 and 968 and packages bearing hazard labels of Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 and Division 5.1.

1.8 There is no proposal to require segregation of packages prepared in accordance with Section II of Packing Instructions 965 and 968 from flammable dangerous goods when loaded into an aircraft cargo compartment or into a ULD as this is not something that can be guaranteed due to the lack of requirements for acceptance and handling of Section II packages. Additionally there is no requirement to specifically identify ULDs that contain packages of lithium batteries prepared in accordance with Section II of Packing Instruction 965 and Packing Instruction 968 which means that the normal methods of verifying segregation through the use of the class or division number on the dangerous goods ULD tag cannot be applied.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to revise Parts 4 and 7 as shown in the appendices to this working paper.

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APPENDIX A

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Parts of this Chapter are affected by State Variation US 2; see Table A-1

11.1 PACKING INSTRUCTIONS

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Packing Instruction 965
Cargo aircraft only for UN 3480

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IA. SECTION IA

Each cell or battery must meet all the provisions of 2;9.3.

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IA.2 Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium ion cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

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IB. SECTION IB

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IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

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II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with other dangerous goods.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

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II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack.

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

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Packing Instruction 968

Cargo aircraft only for UN 3090

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IA. SECTION IA

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IA.2 Additional requirements

- Lithium metal cells and batteries must be protected against short circuits.
- Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium metal cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.

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IB. SECTION IB

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IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

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II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with other dangerous goods.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack.

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

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APPENDIX B

PROPOSED AMENDMENT TO PART 7 OF THE TECHNICAL INSTRUCTIONS

Part 7

OPERATOR'S RESPONSIBILITIES

Chapter 2

STORAGE AND LOADING

Parts of this Chapter are affected by State Variations CA 1, CA 4, IR 2, IR 4, JP 10, JP 11, JP 12, US 15; see Table A-1

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2.2 INCOMPATIBLE DANGEROUS GOODS

2.2.1 Segregation

2.2.1.1 Packages containing dangerous goods which might react dangerously one with another must not be stowed on an aircraft next to each other or in a position that would allow interaction between them in the event of leakage. As a minimum, the segregation scheme shown in Table 7-1 must be followed in order to maintain acceptable segregation between packages containing dangerous goods having different hazards. The scheme applies irrespective of whether the hazard is the primary or subsidiary risk.

2.2.1.2 Packages and overpacks containing lithium ion batteries prepared in accordance with Section IA or Section IB of Packing Instruction 965 and packages and overpacks containing lithium metal batteries prepared in accordance with Section IA or Section IB of Packing Instruction 968 must not be stowed on an aircraft next to, or in a position that would allow interaction in the event of [damage/fire] with packages or overpacks containing dangerous goods which bear a Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1 hazard label. To maintain acceptable segregation between packages and overpacks, the segregation requirements shown in Table 7-1 must be observed. The segregation requirements apply based on all hazard labels applied on the package or overpack, irrespective of whether the hazard is the primary or subsidiary risk.

2.2.2 Separation of explosive substances and articles

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Table 7-1. Segregation between packages

Hazard label	Class or division											
	1	2.1	2.2, 2.3	3	4.1	4.2	4.3	5.1	5.2	8	⁹ see 2.2.1.2	
1	Note 1	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
2.1	Note 2	—	=	—	=	—	—	—	—	—	—	x
2.2, 2.3	Note 2	=	=	=	=	=	=	=	=	=	=	=
3	Note 2	—	=	—	=	—	—	x	—	—	—	x
4.1	Note 2	=	=	=	=	=	=	=	=	=	=	x
4.2	Note 2	—	=	—	=	—	—	x	—	—	—	=
4.3	Note 2	—	=	—	=	—	—	—	—	x	—	=
5.1	Note 2	—	=	x	=	x	—	—	—	—	—	x
5.2	Note 2	—	=	—	=	—	—	—	—	—	—	=
8	Note 2	—	=	—	=	—	x	—	—	—	—	=
⁹ see 2.2.1.2	Note 2	x	—	x	x	—	—	x	—	—	—	=

An “x” at the intersection of a row and column indicates that packages containing these classes of dangerous goods may not be stowed next to or in contact with each other, or in a position which would allow interaction in the event of leakage of the contents. Thus, a package containing Class 3 dangerous goods may not be stowed next to or in contact with a package containing Division 5.1 dangerous goods.

Note 1.— See 2.2.2.2 through 2.2.2.5.

Note 2.— This class or division must not be stowed together with explosives other than those in Division 1.4, Compatibility Group S.

Note 3.— Packages containing dangerous goods with multiple hazards in the class or divisions which require segregation in accordance with Table 7-1 need not be segregated from other packages bearing the same UN number.

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